Spatial distribution and controls of snowmelt runoff in a sublimation-dominated environment in the semiarid Andes of Chile

Supplement

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Section S1: Discriminating sensor noise from actual precipitation

As the original cumulative precipitation record (at an hourly time scale) is a noisy record, it is difficult to identify actual precipitation events from the noise. To overcome this problem, we followed this procedure:

- We averaged the hourly records of cumulative precipitation to daily means.
- We identified days with an increase (P) in the cumulative record.
- At each of those days, we compared the average of the previous five days (Pb) with the average of the following five days (Pf). If Pf > Pb + PT then we assumed that P corresponded to an actual precipitation event. PT is a threshold to be calculated.
- To determine PT, we calculated the number of days on which the albedo and snow height records at TAP increased. We interpreted those increases as days with precipitation. We then compared the number of events from those records against the number of events from the precipitation records. We chose PT as the number that minimizes the average error in that comparison. We obtained a value of 6 mm/day.
- Finally, we distributed daily precipitation to hourly values using the hourly distribution from the cumulative precipitation record.

Section S2: Supplementary images and tables

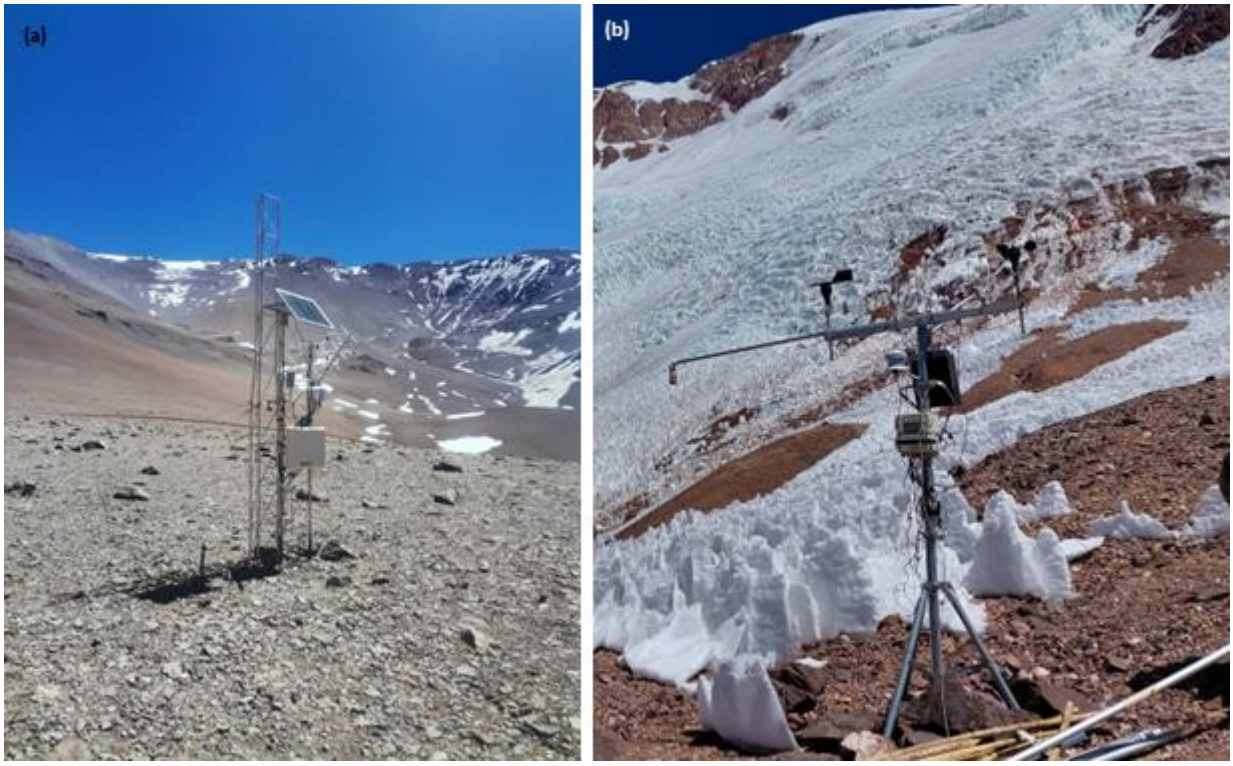

Figure S1: (a) Paso Agua Negra (PAN), and (b) Tapado Glacier (TGL) Automatic Weather Stations.

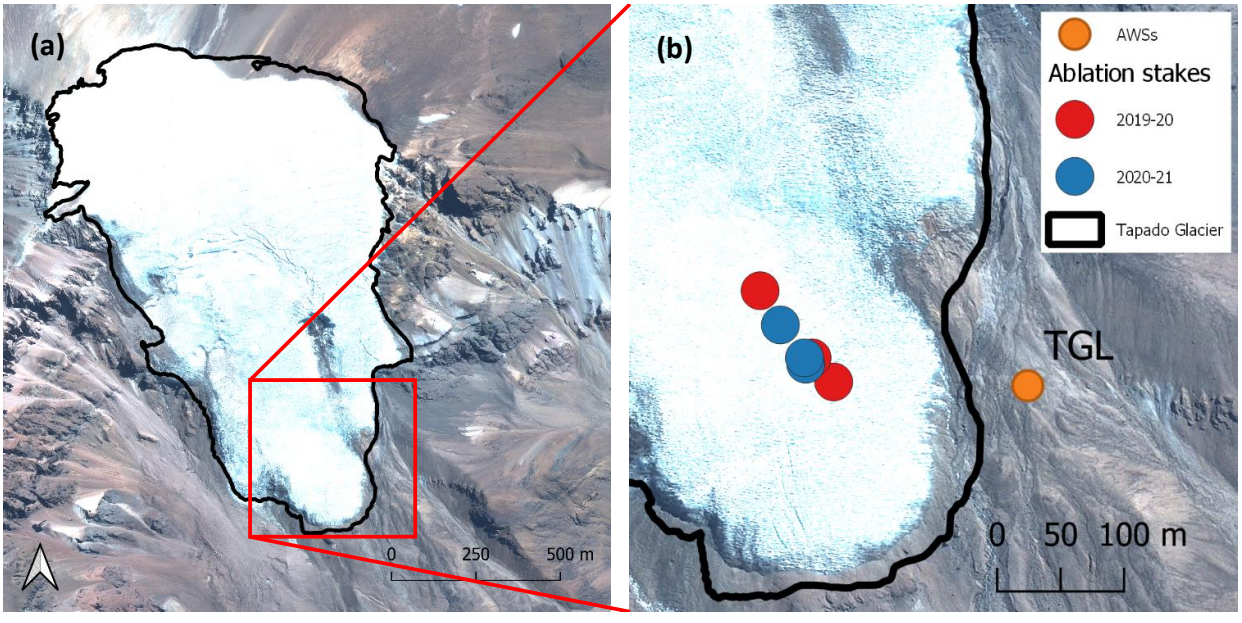

Figure S2: Ablation stakes on Tapado Glacier. (a) Map of ablation stakes, (b-d) Images of ablation stakes.

Figure S3: Images of ablation stakes and penitentes on Tapado Glacier. (a) Ablation stake in summer 2020, (b) Ablation stake in summer 2021, (c) and (d) 3-4 m penitentes in summer 2021.

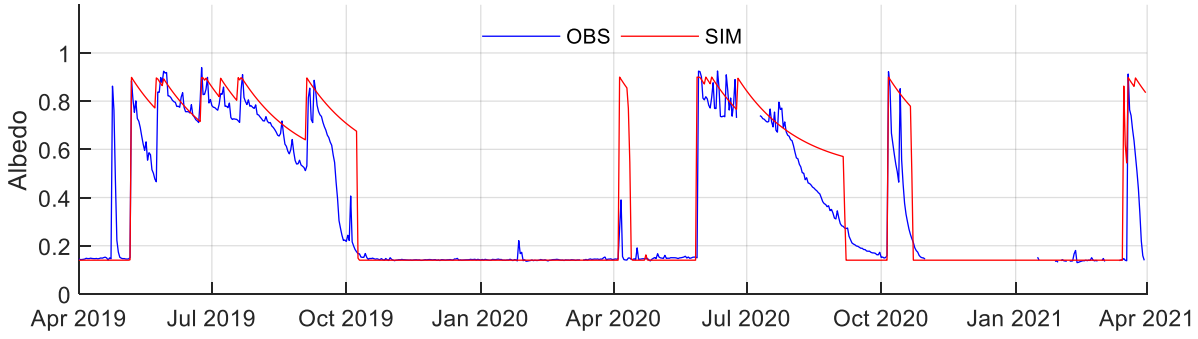

Figure S4: Simulated and observed albedo at TAP after the manual adjustment of the albedo decay parameters (see Table 3).

Table S1: Location of Tapado Glacier ablation stakes

Stake	East	South	Elevation	Year
1	410968	6664161	4765	2019-2020
2	410951	6664180	4794	2019-2020
3	410910	6664233	4761	2019-2020
4	410946	6664175	4754	2020-2021
5	410945	6664180	4756	2020-2021
6	410926	6664206	4766	2020-2021

Table S2: List of satellite images used for the calculation of the snow indices (SA and SP)

Index	Product	Number of images	Dates (YYYYMMDD)
SA	Landsat 8	18	20190413, 20190429, 20190515, 20190616, 20190702, 20190718, 20190803, 20190819, 20190904, 20190920, 20200415, 20200501, 20200517, 20200602, 20200805, 20200821, 20200906, 20200922
	Sentinel 2	15	20190603, 20190623, 20190703, 20190718, 20190728, 20190827, 20190827, 20200408, 20200408, 20200418, 20200523, 20200528, 20200702, 20200806, 20200910
SP	Landsat 8	21	20191006, 20191107, 20191123, 20191209, 20191225, 20200110, 20200126, 20200211, 20200227, 20200314, 20200330, 20201008, 20201024, 20201109, 20201125, 20201211, 20201227, 20210112, 20210128, 20210213, 20210317
	Sentinel 2	23	20191115, 20191115, 20191120, 20200104, 20200104, 20200119, 20200119, 20200124, 20200124, 20200304, 20200304, 20201015, 20201209, 20210118, 20210118, 20210123, 20210123, 20210128, 20210212, 20210227, 20210304, 20210304, 20210314